
Mapping water demand and trends in food manufacturing

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The food industry, a major water consumer, is facing significant environmental challenges (i.e., depletion of freshwater resources due to climate change) that are building up pressure on food security – as the global population is growing, both food and water demand for food production are expected to increase too. In this context, this work identifies water consumption hot spots in food manufacture processes, which will help to allocate resources more effectively and create a more sustainable food chain.

Water usage data was collected from literature and clustered by product and processing technique. Before analysis, data was transformed into standard units when needed/possible.

Findings show that the meat and dairy sectors are the most water intensive ones – water is systematically used to rinse/clean surfaces, pipework and vessels and thus guarantee hygienic standards; however, most cleaning-in-place (CIP) protocols are based on very conservative and outdated protocols, which could be significantly optimised. Similarly, literature reveals scope for further improvement of sterilisation and pasteurisation operations used in packed foods (e.g., pouches, cans, jars) - alternative preservation techniques, like microwaves or pulsed-electric-field (PEF) are being slowly introduced in the sector, so heat could be generated without using water/steam. Water is also a main component in the formulation of a number of food products, although in most cases is removed either by evaporation or sublimation, through drying or freeze-drying processes. Therefore, processing of dough-based products, as well as processing of powder foods and ingredients, constitute a major source of water consumption, too. Finally, this study has analysed water usage per location too, revealing those areas/countries more compromised by climate changes and draught.

The outcomes of this work constitute valuable information for the sector and policy makers that can help to re-evaluate current environmental and manufacturing strategies, increasing sustainability and security of food chains.